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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,411	09/30/2003	Robert Bristol	42P16691	8060

8791 7590 03/31/2006

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EXAMINER
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CHACKO DAVIS, DABORAH

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 03/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/676,411

Applicant(s)

BRISTOL ET AL.

Examiner

Daborah Chacko-Davis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, and 5-8, are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 5,034,304 (Feely).

Feely, in the abstract, in col 3, lines 1-67, in col 4, lines 1-24, in col 6, lines 15-68, discloses method of forming a resist layer of about 100nm (0.1 $\mu$ ) that is photoactive (highly absorbing), thinning the resist layer using a thinner, varying (increasing) the concentration of the photoacid generator in the resist in order to be X-ray imageable composition, wherein the X-ray irradiated on the photoresist causes the interaction of secondary electrons with the photoacid generator (improve efficiency) to produce halogen acid capable of causing crosslinking in the resin system (controlling groups proximal to the acid generator) (claims 1, and 5-8).

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-4, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,034,304 (Feely) in view of U. S. Patent Application Publication No. 2004/0038531 (Nagai et al).

Feely is discussed in paragraph no. 2.

The difference between the claims and Feely is that Feely does not disclose forming a resist using a highly absorbing material selected from fluorine, tin, bismuth, cesium, and antimony (claim 2). Feely does not disclose adding one of F, Sn, Bi, Ce, and Sb into a baseline material (claim 3). Feely does not disclose that the resist is one of a fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate chelate polymer (claim 4).

Nagai, in [0035], [0092], discloses that the highly absorbing material in the photoactive acid generating resist is a fluorine added polymeric film.

Therefore, it would be obvious to a skilled artisan to modify Feely by adding the fluorine containing polymer to the resist composition as suggested by Nagai, because Nagai, in [0046], and [0047], discloses that fluorine containing acid generating agents are added to the top resist layer and adjusted in strength so as to obtain an optimum pattern, and to reduce unevenness on the surface of the pattern.

5. Claims 9-24, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,034,304 (Feely) in view of U. S. Patent Application Publication No. 2004/0038531 (Nagai et al).

Feely, in the abstract, in col 3, lines 1-67, in col 4, lines 1-24, in col 6, lines 15-68, discloses forming a photoactive resist layer (highly absorbing), on a silicon dioxide substrate, having a thickness of about 100nm (0.1 $\mu$ ), thinning the resist layer using a thinner, varying (increasing) the concentration of the photoacid generator in the resist in order to be X-ray imageable composition, wherein the X-ray irradiated on the photoresist causes the interaction of secondary electrons with the photoacid generator (improve efficiency) to produce halogen acid capable of causing crosslinking in the resin system (controlling groups proximal to the acid generator) (claims 9, 13-17, 21-24).

The difference between the claims and Feely is that Feely does not disclose that an etch resistant layer is formed below the imaging layer for pattern transfer from the imaging layer. Feely does not disclose forming a resist using a highly absorbing material selected from fluorine, tin, bismuth, cesium, and antimony (claims 10, and 18 ). Feely does not disclose adding one of F, Sn, Bi, Ce, and Sb into a baseline material (claims 11, and 19). Feely does not disclose that the resist is one of a fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate chelate polymer (claims 12, and 20).

Nagai, in [0035], [0078], discloses forming a novolac resin polymeric film on the semiconductor device, and forming a photoactive SOG film on the resin polymeric film, and patterning the novolac resin film using the patterned SOG film as the mask. Nagai, in [0035], [0092], discloses that the highly absorbing material in the photoactive acid generating resist is a fluorine added polymeric film.

Therefore, it would be obvious to a skilled artisan to modify Feely by transferring the pattern to an underlying etch resistant layer by using the photoactive resist pattern as a mask as taught by Nagai, because Nagai, in [0040], [0041], [0045], and [0046], discloses that employing the claimed photoactive acid generating resist as the mask prevents poor patterning results, and pattern collapse due to the remaining acid in the top resist film. It would be obvious to a skilled artisan to modify Feely by adding the fluorine containing polymer to the resist composition as suggested by Nagai, because Nagai, in [0046], and [0047], discloses that fluorine containing acid generating agents are added to the top resist layer and adjusted in strength so as to obtain an optimum pattern, and to reduce unevenness on the surface of the pattern.

### ***Response to Arguments***

6. Applicant's arguments filed January 11, 2006, have been fully considered but they are not persuasive. The 102 and 103 rejections made in the previous office action (paper no. 0914) are maintained.

A) Applicants argue that Feely does not disclose (1) forming a resist using a highly absorbing material; (2) thinning the resist to a pre-determined thickness used as an imaging layer; and (3) improving the efficiency of a photoactive acid generator (PAG) to capture secondary electrons produced by an ionizing radiation in the resist.

Feely, in col 6, lines 5-14, discloses the use of highly absorbing material as a resist. Feely, in col 6, lines 51-68, discloses that i) submicron images on the order of 0.1 micron is produced with the photosensitive compositions using ionizing radiation

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(radiations from e-beam source, X-ray source, i.e., thinning the resist), and ii) that the secondary electrons generated by the radiation interacts with the PAG (PAG captures the secondary electrons) resulting in the catalyzing of the crosslinking process (i.e., improves the efficiency of the PAG).

B) Applicants argue that Feely does not disclose increasing the PAG concentration in the resist solution.

Feely, in col 6, lines 20-40, and in col 7, lines 66-68, in col 8, lines 1-2, discloses increasing the PAG (acid generating compound) concentration (parts by weight) in the resist composition.

C) Applicants argue that Feely and Nagai do not disclose the highly absorptive material recited in claims 11-12, and 19-20, and that Nagai's insulation layer exists as insulation layers that cannot be used as a resist that is etched away.

Feely is not depended upon to disclose the recitation in claims 11-12, and 19-20. Nagai is not depended upon to disclose a resist or a resist patterning method. Nagai is depended upon to disclose the claimed absorptive material composition. However, Nagai teaches the use of a photoactive SOG film, fluorinated carbon films as patterning mask insulation layers (figures 2G thru 2I); the SOG film is used as mask to pattern the layer beneath, followed by complete removal of the SOG mask (i.e., the SOG film after being patterned and used as mask to etch the layers beneath, is completely removed).

***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For




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more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

  
March 28, 2006.

  
**JOHN A. MCPHERSON**  
**PRIMARY EXAMINER**